SHAO-HUNG CHAN

Email: shaohung@usc.edu | Website: https://shchan13.github.io | Github: https://github.com/shchan13

RESEARCH INTERESTS

Multi-Agent Path Finding (MAPF), Task and Motion Planning (TAMP), Artificial Intelligence

EDUCATION

University of Southern California	**Fall 2019-Present**
Ph.D. in Computer Science	
National Taiwan University, Taipei, Taiwan	**Fall 2017-Spring 2019**
Master of Science in Electrical Engineering	
Overall GPA: 4.14/4.3 (4.0/4.0)	
National Cheng Kung University, Tainan, Taiwan	**Fall 2013-Spring 2017**
Bachelor of Science in Electrical Engineering	
Overall GPA: 4.23/4.3 (4.0/4.0), Cumulative score: 93.69/100, Graduation Rank: 3/159 (1.9%)	
Outstanding student for the academic achievement in the school year 2015-2016.	
Exchange Program to University of California, Berkeley	**Fall 2016**
Be the only recipient of 4000 USD exchange student fellowship from NCKUEE to UCB	

PUBLICATIONS

Book (1)

- **Artificial Intelligence and Automation**   **Fall 2020**
  Sven Koenig, **Shao-Hung Chan**, Jiaoyang Li, Yi Zheng

Conference Presentations (13)

- **International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)**   **Fall 2023**
  Shao-Hung Chan, Zhe Chen, Dian-Lun Lin, Yue Zhang, Tsung-Wei Huang, Daniel Harabor, Sven Koenig, Thomy Phan,
  "Anytime Multi-Agent Path Finding using Operation Parallelism in Large Neighborhood Search (Extended Abstract)."

- **International Joint Conference on Artificial Intelligence (IJCAI)**   **Spring 2023**
  Carlos Hernández, William Yeoh, Jorge A Baier, Ariel Felner, Oren Salzman, Han Zhang, **Shao-Hung Chan**, Sven Koenig,
  "Multi-objective search via lazy and efficient dominance checks."

- **International Symposium on Combinatorial Search (SoCS)**   **Spring 2023**
  Shao-Hung Chan, Roni Stern, Ariel Felner, Sven Koenig,
  "Greedy Priority-Based Search for Suboptimal Multi-Agent Path Finding". [link]

- **International Symposium on Combinatorial Search (SoCS)**   **Spring 2022**
  Eli Boyarski, **Shao-Hung Chan**, Dor Atzmon, Ariel Felner, Sven Koenig,
  "On Merging Agents in Multi-Agent Pathfinding Algorithms" (Best Student Paper). [link]

- **AAAI Conference on Artificial Intelligence (AAAI)**   **Fall 2021**
  Shao-Hung Chan, Jiaoyang Li, Graeme Gange, Daniel Harabor, Peter Stuckey, Sven Koenig,
  "Flex Distribution for Bounded-Suboptimal Multi-Agent Path Finding". [link]

- **Extended Abstract on International Symposium on Combinatorial Search (SoCS)**   **Spring 2021**
  Shao-Hung Chan, Jiaoyang Li, Graeme Gange, Daniel Harabor, Peter J. Stuckey, Sven Koenig,
  "ECBS with Flex Distribution for Bounded-Suboptimal Multi-Agent Path Finding". [link]

- **Extended Abstract on International Symposium on Combinatorial Search (SoCS)**   **Spring 2021**
  Han Zhang, Mingze Yao, Ziang Liu, Jiaoyang Li, Lucas Terr, **Shao-Hung Chan**, T. K. Satish Kumar, Sven Koenig,
  "A Hierarchical Approach to Multi-Agent Path Finding." [link]

- **International Conference on Automated Planning and Scheduling (ICAPS)**   **Spring 2021**
  Jiaoyang Li, Zhe Chen, Yi Zheng, **Shao-Hung Chan**, Daniel Harabor, Peter J. Stuckey, Hang Ma, Sven Koenig,
  "Scalable Rail Planning and Replanning: Winning the 2020 Flatland Challenge". [link]

- **Workshop on Multi-agent Path Finding at IJCAI (WoMAPF)**   **Fall 2020**
  Shao-Hung Chan, Jiaoyang Li, Daniel Harabor, Peter J. Stuckey, Graeme Gange, Liron Cohen, Sven Koenig,
  "Nested ECBS for Bounded-Suboptimal Multi-Agent Path Finding". [link]

- **IEEE International Conference on Systems, Man, and Cybernetics (SMC)**   **Fall 2019**
  Shao-Hung Chan, Xiao-Yue Xu, Ping-Tsang Wu, Ming-Li Chiang, Li-Chen Fu,
  "Real-time Obstacle Avoidance using Supervised Recurrent Neural Network with Automatic Data Collection and Labeling". [link]

- **IEEE International Conference on Intelligent Robots and Systems (IROS)**   **Fall 2019**
  Ping-Tsang Wu, Chee-An Yu, **Shao-Hung Chan**, Ming-Li Chiang, Li-Chen Fu,

"Multi-Layer Environmental Affordance Map for Robust Indoor Localization, Event Detection and Social Friendly Navigation". [link]

- **IEEE International Conference on Systems, Man, and Cybernetics (SMC)** **Fall 2018**
  Shao-Hung Chan, Ping-Tsang Wu, Li-Chen Fu, "Robust 2D Indoor Localization through Laser SLAM and Visual SLAM Fusion". [link]
- **IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)** **Fall 2018**
  Shih-Hsi Hsu, **Shao-Hung Chan**, Ping-Tsang Wu, Kun Xiao, Li-Chen Fu, "Distributed Deep Reinforcement Learning based Indoor Visual Navigation". [link]

HONORS & AWARDS

Best Paper Award in SoCS 2022	**Spring 2022**
PhD Sandwich Program at Ben-Gurion University of the Negev	**Spring 2022**
First Place in Flatland Challenge in NeurIPS 2020 Competition	**Fall 2020**

- Rank 1 in both round 1 and round 2

Best Master Thesis Award of the year in NTUEE	**Spring 2019**
Best Student Paper Award Finalist of IEEE SMC Society [pdf]	**Fall 2018**
Outstanding Student for the Academic Achievement in the School Year 2015-2016	**Spring 2017**

- Graduation Rank: 1/37 (class), 3/159 (department), Overall GPA: 4.23/4.3

RESEARCH EXPERIENCES

PlanViz: A visualization tool for the League of Robot Runners Competition [link] **Spring 2023**
Supervised by Prof. Daniel Harabor and Prof. Sven Koenig

- Develop visualization tool for Multi-Agent Path Finding.

Parallel Programming for Multi-Agent Path Finding **Fall 2023**
Supervised by Dr. Thomy Phan and Prof. Sven Koenig

- Develop parallel algorithms for Anytime Multi-Agent Path Finding.

Enhancements on Priority-Based Search for Near-Optimal Multi-Agent Path Finding **Spring 2022**
Supervised by Prof. Roni Stern, Ariel Felner, and Sven Koenig
Speeding up techniques in solving Multi-Agent Path Finding with near-optimal solutions.

Nested Framework and Flex Distribution for Bounded-Suboptimal Multi-Agent Path Finding **Spring 2020**
Supervised by Prof. Sven Koenig

- Nested structure for ECBS-related algorithms with heuristics.

Hierarchical Multi-Agent Path Finding **Fall 2020**
Supervised by Prof. Sven Koenig

- Develop a hierarchical solver for multi-agent path finding.

Simple Temporal Network with Uncertainty for Multi-Agent Path Finding **Fall 2019**
Supervised by Prof. Sven Koenig

- Developed a decentralized scheduling system to handle uncertainty in MAPF.

Optimal Navigation System for a Mobile Robot to Execute Dynamical Multiple Social Tasks **Spring 2019**
Master Thesis – advisor: Dr. Li-Chen Fu (Best Master Thesis Award of the year)

- Developed social service robot system integrating visual and audio perception, task and motion planning, and human robot interaction.

Social Friendly Navigation based on Multi-Layer Environmental Affordance Map **Fall 2018**
Supervised by Prof. Li-Chen Fu

- Developed scene recognition and human action recognition system with over 90% accuracy.

Real-time Obstacle Avoidance using Supervised Recurrent Neural Network with Automatic Data Collection and Labeling **Spring 2018**
Supervised by Prof. Li-Chen Fu

- Developed an obstacle avoidance algorithm using unsupervised recurrent neural network (RNN) techniques with relative distance error less than 7%.

Robust 2D Indoor Localization through Laser SLAM and Visual SLAM Fusion **Spring 2018**
Supervised by Prof. Li-Chen Fu

- Be selected as SMC 2018 Best Student Paper Award Finalist (Top 5 among all papers).
- Proposed a novel SLAM fusion process to achieve robust localization with relative distance error less than 5%.

PROGRAMMING SKILLS

Operating System: ROS, Linux, Naoqi, Windows   **Programming Language:** Python, C++, C#
Software: Gazebo, Android Studio, MATLAB, Laker Layout, Verilog, HSPICE, PSPICE, Labview
Hardware:

- **Robots:** Pioneer 3DX Robot, Self-build Omni-directional wheel, Pepper Robot, Baxter Robot, Universal Robot UR5
- **Embedded System:** Nvidia Tegra TX2, Arduino